



WORK STUDY IN FACTORY  
(CABLE SLACK MAKING OPERATION)

MOHD NAZLIZAN BIN IBRAHIM  
(98138046)

NORHISSHAM BIN ABDUL HAMID  
(99142711)

WAN NAZRUL FAIZAL BIN WAN MOHAMAD  
(99041265)

DIPLOMA IN MECHANICAL ENGINEERING  
(MANUFACTURING)  
FACULTY OF MECHANICAL ENGINEERING  
MARA UNIVERSITY OF TECHNOLOGY (UITM)  
APRIL 2002



## **TABLE OF CONTENTS**

<b>CONTENTS</b>	<b>PAGE</b>
PREFACE	i
ACKNOWLEDGEMENTS	ii
LIST OF TABLES	iii
LIST OF FIGURES	iv

## **CHAPTER 1 - INTRODUCTION**

1.0	Introduction	1
1.1	Definition	2
1.2	Objective	2
1.3	The History Of Work Study	2
1.4	Aim Of The Work Study	4
1.5	The Pioneer Of Methods	5
1.6	The Element Of Job Design	6
1.7	Task Analysis	9
1.8	Worker Analysis	9
1.9	Environmental Analysis	10

## **CHAPTER 2: ELEMENT OF WORK STUDY**

2.0	Element Of Work Study	13
2.1	Method Study	13
2.1.1	Select	14
2.1.2	Record	15
2.1.3	The Examine Step	16
2.1.4	Develop An Improved Work Method	18
2.1.5	Install And Maintain	19
2.2	Work Measurement	19
2.2.1	Definition	20
2.2.2	Scope	20
2.2.3	The Purpose Of Work Measurement	21
2.2.4	The Principles Of Work Measurement	23
2.2.5	The Procedure Of Work Measurement	24
2.2.6	Method Of Time Study Adopted	25
2.2.7	Element Breakdown A Description	25
2.2.8	Timing Method, Equipment Used	27
2.2.9	Method Of Assessment Of Operation	27
2.2.10	Calculation Of Basic Time	30
2.2.11	Assessment Of Relaxation & Contingency Allowance	31
2.3	Table Of Fatigue Factor	32
2.4	The Concept Of A Standard Time For An Operation	34
2.4.1	The Standard Performance Time For An Operation	34
2.4.2	General Methods Of Measuring The Standard Time For And Operation	37
2.5	Standard Time	38
2.6	Importance Of Performance Time For Manufacturing	40

## **CHAPTER 3: DATA AND RECORD OF WORK MEASUREMENT**

3.0	Flow Chart	43
3.1	Processes Of Flow Chart: Present Method	43
3.1.1	Processes Of Flow Chart: Proposed Method	45
3.1.2	Flow Chart Of Operator A: Present Method	48
3.1.3	Flow Chart Of Operator B: Present Method	49
3.1.4	Flow Chart Of Operator A: Proposed Method	51
3.1.5	Flow Chart Of Operator B: Proposed Method	52
3.2	Time Study Observation Sheets	53
3.2.1	Time Study Observation Sheets (Overall Of Operation): Present Method	53
3.2.2	Time Study Observation Sheets (Overall Of Operation): Proposed Method	57
3.3	Worker Machine Chart	60
3.3.1	Worker Machine Chart: Present Method	60
3.3.2	Worker Machine Chart: Proposed Method	62
3.4	Multi Activity Chart	64
3.4.1	Multi Activity Chart (Operator A): Present Method	64
3.4.2	Multi Activity Chart (Operator B): Present Method	65
3.4.3	Multi Activity Chart (Operator A): Proposed Method	67
3.4.4	Multi Activity Chart (Operator B): Proposed Method	68
3.5	Difference Table	69
3.5.1	Difference Table Of Operation	69
3.5.2	Difference Table Of Worker: Operator A	70
3.5.3	Difference Table Of Worker: Operator B	71
3.6	Summary: For Worker Machine Chart	72

3.6.1	Summary: Element 1 To 13 (50 Units): Present Method	72
3.6.2	Summary: Element 14 And 15 (1000 Units): Present Method	73
3.6.3	Summary: Element 1 To 13 (1000 Units): Present Method	74
3.6.4	Summary: Element 1 To 15 (1000 Units): Present Method	75
3.6.5	Summary: Element 1 To 13 (50 Units): Proposed Method	76
3.6.6	Summary: Element 14 & 15 (1000 Units): Proposed Method	77
3.6.7	Summary: Element 1 To 13 (1000 Units): Proposed Method	78
3.6.8	Summary: Element 1 To 15 (1000 Units): Proposed Method	79
3.7	Summary: For Multi Activity Chart	80
3.7.1	Summary: Present Method (Operator A)	80
3.7.2	Summary: Present Method (Operator B)	81
3.7.3	Summary: Proposed Method (Operator A)	82
3.7.4	Summary: Proposed Method (Operator B)	82

#### **CHAPTER 4: ANALYSIS AND RESULT OF WORK MEASUREMENT**

4.0	Calculation	83
4.1	Converting Element (1 to 50 units)	83
4.1.1	Converting Actual Time (50 to 1000 units)	84
4.1.2	Completely Process for Storage	85
4.2	Total Normal Time	85
4.2.1	Converting Element (1) to (13): 50 - 1000 units	85